



Science News-Letter

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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Bowing—

The SCIENCE NEWS-LETTER is pleased to appear before you in its new printed dress. It hopes that you will not mistake it for a conventional, old-line magazine. It wishes to continue as it started out in life—a personal service to its readers.

Born over four years ago, on March 13, 1922, of the demand and interest of those individuals who had caught a glimpse of *Science Service's* news reports to newspapers, the SCIENCE NEWS-LETTER has since proved interesting to laymen, scientists, students, teachers and children.

Into the pages of the NEWS-LETTER have been fed—and will continue to be fed—the cream of *Science Service's* output directed at the newspapers of the world. To this is added material especially prepared.

Now that the NEWS-LETTER is printed, it is possible to introduce novel features that we believe make its contents more valuable or easily used. Turn the pages and note:

It is a *separable* magazine. You can clip or tear out any article without losing or damaging another article on the other side.

Each article is automatically *indexed* by the key word printed above its heading. (See page 2 for explanation.)

Each article is automatically *dated* by its last line.

Books are *reviewed in brief* as they are received from the publishers.

The *classics of science* and striking passages from current books, addresses and periodicals are carefully selected and published.

Important *anniversaries* of science are appropriately noted week by week in a special department.

Regular articles tell of the happenings in the *skies* and in the great outdoors.

Photographs aid in the telling of the week's science.

Science News-Letter, October 2, 1926

ASTRONOMY



GEORGE ELLERY HALE

He Knows The Sun

"The most intimate acquaintance of the sun" is the title that might well be claimed by Dr. George Ellery Hale, who is shown here examining the image of the sun formed by the coelostat telescope in the rotunda of the new building of the National Academy of Sciences in Washington, a project largely the fruit of his labors.

He invented the spectroheliograph. By means of this device photographs of the sun may be made with a single wave length of light. In 1895, he organized the Yerkes Observatory of the University of Chicago, where he served as director until 1905, when he was called to organize the Mt. Wilson Observatory of the Carnegie Institution of Washington. There he remained as director until 1923 when he retired from active duty and became honorary director, in charge of policy and development, though he has continued his researches. Recently he developed the spectrohelioscope, a modification of his earlier invention, by which it is now possible to view the sun directly in light of a single wave length.

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CHEMISTRY

Ice Cream From Crude Oil

By EDWIN E. SLOSSON

The chemists of America recently celebrated the semi-centennial of their organization with a meeting at Philadelphia. Dr. Edwin E. Slosson, author of "Creative Chemistry," etc., in this article tells of some of the achievements and hopes of modern chemistry as revealed in the sessions.

Ice cream made from crude oil is one of the many marvels forecast by Prof. James F. Norris, president of the American Chemical Society. Edible fats, the same as those in vegetable and animal foods, and other fats equally nutritious but not found in nature, can be obtained by breaking up the molecules of mineral oil and rearranging the atoms to form new compounds.

This cracking process has been applied to petroleum for many years to obtain a larger yield of the gasoline distillate, but the investigations recently carried out by the Petroleum Institute have shown that it is possible to attach oxygen to the cracked molecules and so produce alcohols and acids of all sorts. Aromatics, flower perfumes, fruit flavors, drugs and dyes in infinite variety may be made by such methods. This suggests that petroleum which has hitherto been used for fuel and lubricating may be found in the future to be even more valuable as a source of substances for which man has hitherto been dependent upon the chance bounty of nature. Glycerin, which is now obtained from the decomposition of soap fats, can be produced from petroleum, and transformed into nitroglycerin for dynamite. Synthetic plastics like rubber and bakelite may also be manufactured from the same raw material. It is unfortunate that we should come to realize the possibilities of petroleum only now, when the Government Oil Commission announces that the known oil reserves of the United States will last only six years at the present rate of consumption.

But Dr. Norris has his answer to

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Science News-Letter Is Already Indexed

In order to aid in catching the items that concern you and to facilitate clipping and filing, a key word in small capitals has been printed on the right of the line above each article. This follows the classification of the Library of Congress since this system has come into common use in the libraries of the country owing to the publication by the Government of the card index of all new books. We print below a list of the subject titles which will be most used in the SCIENCE NEWS-LETTER. "Outline Scheme of Classes," issued by the Library of Congress and purchasable from the Superintendent of Documents, Washington, for 10 cents, contains a more complete classification.

How To Clip and Classify

The SCIENCE NEWS-LETTER is a "cut-up" periodical. It aims to provide the information you want when and where you want it. It is a continuous loose-leaf supplement to any text-book or encyclopedia. But to make it most useful you must do your part. The best way to handle current news in science is to adopt the rule of the thrifty housewife in fruit season: "Eat what you can and what you can't eat you can."

Here is a good scheme if you haven't a better one. Get a dozen or twenty folders or envelopes which fit in a vertical filing case or drawer. Cut out the class titles of topics and paste on the upper edge of the envelopes. Or write on such titles as you prefer. If you use the Dewey Index or some other system put these numbers or letters in place of the Library of Congress marks.

As soon as you get a copy of SCIENCE NEWS-LETTER look it over, read through such articles as you have time to and cut out such as seem to you worth preserving for reference. Drop the clippings into their proper envelopes right away. Don't throw them into a desk drawer to accumulate until you have time to sort them over. You never will find time for that. At least we hope you will always have something more pleasant and profitable to do than filing a heap of old clippings. SCIENCE NEWS-LETTER is a new sort of magazine. Try a new way of using it.

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B Philosophy.
BF Psychology.
G Geography, voyages, travel.
GA Mathematical and astronomical geography.

GB Physical geography.
GC Oceanology and oceanography.
GF Anthropogeography.
GN Anthropology. Somatology. Ethnology. Ethnography. Pre-historic archeology.
GR Folklore.
GT Manners and customs.
GV Sports and amusements. Games.
HC Economic history and conditions. National production.
HE Transportation, and communication.
HF Commerce.
HM Sociology. General.
L Education.
M Music.
N Fine Arts.
P Philology and linguistics.
Q Science. General.
QA Mathematics.
QB Astronomy.
QC Physics.
QD Chemistry.
QE Geology.
QH Natural history.
QK Botany.
QL Zoology.
QM Human anatomy.
QP Physiology.
QR Bacteriology.
R Medicine. General.
S Agriculture. General.
SB Field crops. Horticulture. Landscape gardening. Pests and plant diseases.
SD Forestry.
SF Animal culture. Veterinary medicine.
SH Fish culture and fisheries.
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T Technology. General.
TA Engineering — General.
TC Hydraulic engineering.
TD Sanitary and municipal engineering.
TE Roads and pavements.
TF Railroads.
TG Bridges and roofs.
TH Building construction.
TJ Mechanical engineering.
TK Electrical engineering and industries.
TL Motor vehicles. Cycles. Aeronautics.
TN Mineral industries. Mining and Metallurgy.
TP Chemical technology.
TR Photography.
TS Manufactures.
TT Trade.
TX Domestic science.
U Military science. General.
V Naval science. General.

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Germany's New Scientific Researches Reported

The most important meeting of German scientists, that of the Association of German Natural Scientists and Physicians, has just been held at Duesseldorf. Below are reports of this meeting written by Science Service's Berlin Correspondent, Dr. Maxim Bing, and transmitted to America by cable.

MEDICINE

Dead Brought To Life

Bringing the dead to life, or at least restoring life to persons apparently dead of paralysis of the lungs and heart stoppage, is the miracle of modern surgery described before the Association of German Natural Scientists and Physicians by Prof. O. Bruns of the University of Koenigsburg. This is a disease combination that has up to the present been regarded as hopeless.

Prof. Bruns opens the chest of an apparently lifeless patient and massages the motionless heart, at the same time administering oxygen by artificial respiration. He has found that the blood will absorb as much as 86 per cent. of oxygen, and he credits the success of his operations more to its use than to the surgical massage. The oxygen, he says, stimulates the heart to renewed action by irritation of the cardiac muscles.

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MEDICINE

Heart Hormone Discovered

A discovery which is regarded as of great future importance in medicine and surgery is that of the hormone, or ductless gland secretion, responsible for the action of the heart. Prof. Ludwig Haberlandt of the University of Innsbruck, Austria, obtained the substance in an extract made from the hearts of frogs. It is soluble in alcohol but not in ether, and will pass through animal membranes when in solution. It is not destroyed by heating at ordinary laboratory temperatures. It powerfully accelerates the pulse and at the same time decreases the blood pressure. So potent is the substance that it will cause even a totally dead heart to contract. Physicians here believe that it will soon come into use as a new cardiac tonic.

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PHYSICS

Smaller Than Electron

New evidence that there is another world of almost infinite minuteness, beyond the electron which only recently replaced the atom as the smallest thing in the universe, was brought forward by Prof. Felix Ehrenhaft of Vienna University at the meeting

of the Association of German Natural Scientists and Physicians. Prof. Ehrenhaft's data were obtained by means of a new and highly powerful apparatus for ultra-microscopic examination devised by himself, which makes possible the observation of particles far below the limits of ordinary microscopic visibility, floating freely in a gaseous atmosphere in a magnetic field.

He observed in this magnetized sub-microscopic field the behavior of globular bits of gaseous selenium with diameters of only one two-hundred-fifty-thousandth of an inch. Their rate of drift, under the influence of the magnet, indicated that the electric charges they carried were less than the equivalent of one electron. This would indicate, according to Prof. Ehrenhaft, that the electron is subdivisible and therefore that something smaller than the electron exists.

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CHEMISTRY—MEDICINE

Synthetic Rival To Quinine

Malaria, the most obstinate of the tropical diseases in its resistance to the advance of modern medicine, may have its hold broken at last, by a synthetic drug resembling quinine but declared to be much more powerful, produced in the laboratories of the Elberfelder Farbenfabriken. The discovery created a sensation when it was announced at the meeting of the Association of German Natural Scientists and Physicians, and it was declared that it has a significance comparable to that of Bayer 205, the remedy for African sleeping sickness, which converts hitherto plague-stricken areas into potential homes for men.

Quinine, for centuries the only known specific for malaria and still the standard remedy, does not wholly conquer the disease, especially some tropical forms of it. It is quickly fatal to certain of the malarial parasites, but other strains of the microbes resist it. The new remedy, which has been christened "Plasmochin," wipes them all out impartially. It is thus regarded as a complete cure, in contrast to the merely partial effectiveness of the extract of natural cinchona bark. Physicians say that there is now hope of killing off malaria germs until they are as extinct as the dinosaur and the dodo, simply by clearing up the blood of all malaria patients until there are no more of the dreaded microbes for the Anophe-

les mosquito to carry. Exactly the same sort of thing has been done with yellow fever, they point out, and that without a specific curative drug with which the physician might help the sanitarian. With plasmochin the conquest of malaria should be easier than that of "yellow jack," in spite of the wider incidence of the former malady.

The new remedy is said to be easier to take than quinine, because it has no bitter taste. Heavy doses are sometimes followed by cyanosis or blueness of the skin, but this is of brief duration. Upsetting of the stomach rarely occurs, and the patient's blood cells are not attacked.

The discovery of plasmochin was not a matter of lucky chance, but the result of a deliberately planned campaign of chemical and biological research. Not one preparation, but several, in a series of increasing potency, were sought. The first malaria cure worked out was one for a mild form of the disease that afflicts birds and sometimes makes life miserable for pet canaries. Then a second compound was elaborated which would cure the type of malaria with which physicians sometimes inoculate men to cure them of progressive paralysis. Finally the attack was made on severe cases of malaria, naturally acquired.

The exact chemical structure of plasmochin was not revealed. It was frankly stated that the discoverers feared that their work might be pirated and exploited by outsiders.

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MEDICINE

Hemp Poison Standardized

The poison of the hemp plant, important both in legitimate medicine and in drug addictions under the name of hasheesh or bhang, has been studied and standardized by Prof. W. Wiechowski of the German University at Prague. Prof. Wiechowski has discovered that the poisonous principle can be entirely extracted with petrol ether. One-tenth of a cubic centimeter of this extract, or about two drops, will kill a laboratory mouse. It is stated that it will now be possible to control the strength of medical preparations using hemp, which have hitherto been of uneven potency and hence sometimes unsafe to use.

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Dr. Paul Heymans of Massachusetts Institute of Technology has split a second into one billion parts.

SCIENCE SERVICE

Science Service is a unique institution, established at Washington for the purpose of disseminating scientific information to the public. It aims to act as a sort of liaison agency between scientific circles and the world at large. It interprets original research and reports the meetings of learned societies in a way to enlighten the layman. The specialist is likewise a layman in every science except his own and he, too, needs to have new things explained to him in non-technical language. Scientific progress is so rapid and revolutionary nowadays that no one can keep up with it from what he learned at school. Science Service endeavors to provide life-continuation courses in all the sciences for newspaper readers anywhere in America without tuition fees or entrance examinations.

In a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic institutions, as well as the prosperity of the individual, may be said to depend upon the ability of people to distinguish between science and fakes, between the genuine expert and the pretender.

Science Service spares no pains or expense in the endeavor (1) to get the best possible quality of popular science writing and (2) to get it to the largest possible number of readers. If in doing this it can make both ends meet, so much the better. If not, it will do it anyway.

Through the generosity of E. W. Scripps, Science Service has been assured of such financial support as to insure its independence and permanence. Mr. Scripps's long and wide experience as a newspaper editor and proprietor had convinced him of the importance of scientific research as the foundation of the prosperity of the nation and as a guide to sound thinking and living and he realized the need for an independent agency that would bring the results of research to the attention of the entire people so these could be applied to the solution of their personal, social or political problems.

Science Service is chartered as a non-profit-making institution and all receipts from articles, books, lectures and films are devoted to opening up new avenues for the diffusion of knowledge and developing promising methods of popular education. Although Science Service has a philanthropic purpose, it is conducted on business principles, with the aim of making each branch of its activities ultimately self-supporting so far as possible. All ac-

ceptable contributions are paid for and all published articles are charged for.

Science Service is under the control of a Board of Trustees composed of ten scientists and five journalists. The leading national organizations of all the sciences, the National Academy of Sciences, the National Research Council, and the American Association for the Advancement of Science, appoint three trustees each.

Science Service is not a governmental institution, but it is in close contact with the numerous governmental bureaus of research. It is not under the control of any clique, class or commercial interest. It has no connection with any particular publisher or syndicate. It will supply any news agency or newspaper on even terms. It is not the organ of any single scientific association. It serves all the sciences. It engages in no propaganda, unless it be called propaganda to urge the value of research and the usefulness of science.

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PAST VOLUMES

Nine volumes of the SCIENCE NEWS-LETTER have been issued in mimeographed form. Volume I consisted of numbers 50 to 90, inclusive, including the period March 13 to December 30, 1922; thereafter volumes consisted of 26 numbers covering half-year periods, with the exception of Volume IX which consisted of numbers 273 to 285, inclusive, and included the three-month period of July, August and September of this year. Volume X begins with this number, the first to be printed, and will cover only the three last months of this year. Thereafter volumes will cover half-year periods. The pages in each volume will be numbered consecutively.

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Two new subway tunnels are being constructed under the Thames.

Kapok, a floss obtained from pods of a tree in Java, is used throughout the world as a material for lifebelts and buoys.

The government recently spent \$25,000 in repairing a temporary office building, damaged by the white ants known as termites.

Natives of Tierra del Fuego are said to endure extreme cold with greater hardihood than even the Eskimos of the north.

Rubberized wall paper, which may be washed or disinfected without injury, is being used by hospitals and some other public buildings.

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The Science News-Letter Advertisement

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SCIENCE SERVICE
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Fighting Forest Fires With Weather Science



Lightning striking in a forest.

By C. FITZHUGH TALMAN

A strange sight witnessed the other day in a logging camp was that of the lumberjacks letting dinner wait while they consulted a scientific instrument. The instrument was one in which a pen, tracing a wavy line on a moving sheet of paper, showed how much moisture there was in the atmosphere. The question that it answered on this occasion was: "Can we smoke this afternoon?"

Farmers, sailors and people in various other walks of life have long been in the habit of conducting their affairs according to the weather. Now the lumbermen have discovered that they, too, must keep close watch of the weather and regulate their undertakings accordingly, unless they are willing to see the timber riches of the country go up in smoke. And Uncle Sam's weather prognosticators have taken a new burden upon their already overloaded shoulders. The blame for a forest fire is now laid at their doors if, before it happened, they failed to predict the occurrence of "fire weather."

There is a classic illustration of the fact that certain types of weather may be more conducive than others to the prevalence of disastrous conflagration. In the valleys of the Alps a warm parching wind called the "Foehn" has long been notorious for causing fires to spread with uncontrollable fury. When the well-known signs of its approach are observed, ordinary precautions against fire are redoubled. In some districts

all domestic fires are extinguished and even the lighting of a cigarette is forbidden while the wind is blowing.

The east winds of Washington and Oregon enjoy a similar reputation among persons concerned in protecting the magnificent forests of those states. When such winds are preceded by a period of even ordinarily dry warm weather, the forest materials become so inflammable that fires quickly got out of hand. The term "blow-up" days is applied by the western foresters to brief spells of

weather during which, in some cases, more damage is done by fire than during all the rest of the season.

In 1910 and 1912 fires in the northwest were extremely disastrous. Hence in the spring of 1913 the United States Forest Service and the Western Forestry and Conservation Commission appealed to the Weather Bureau to make a special study of the meteorological conditions under which the east winds occur, with a view to forecasting them far enough in advance for preparations to be made to prevent fires by shutting down logging operations, refraining from the burning of slash, and taking other precautions familiar to foresters; also to enable the fire-fighting forces to be put on guard and deployed in such a way as to attack fires with the least possible delay. The Weather Bureau complied with this request as far as was then possible. Arrangements were made to secure additional weather reports from Canada in order to enlarge the field covered by the daily weather map. Warnings of dangerous atmospheric conditions in the western forests were first issued at Portland and San Francisco in 1914.

This was the beginning of a service that has now been extended to all the forested regions of the country. The undertaking has been a cooperative one on the part of the Weather Bureau, the Forest Service, various

(Just turn the page)



After the forest fire.

forestry associations and the state forestry commissions. Both of the Federal bodies have assigned experts to carry on elaborate studies in the field, and have devised special instruments for gauging the fire hazard as determined by atmospheric conditions.

Of course the east wind of the northwestern forests is only one example of fire weather. The conditions that favor the occurrence of fires vary from one part of the country to another. Roughly speaking, fire weather may be divided into three types: viz., (1) hot, dry periods, favorable for the start and spread of fires; (2) periods of high winds and gales, favorable for the rapid spread of existing fires; and (3) lightning storms, which themselves start fires. There may also be combinations of two or more of these conditions.

The degree to which changes in the humidity of the air affect the fire hazard varies with different types of timber and ground cover. Studies have been made in the various forested regions to determine what percentage of "relative humidity" will permit fires to spread, and also what percentage constitutes a serious danger. Thus at the Wind River Forest Experiment Station, in Idaho, it has been found that fires do not spread if the relative humidity is above 60 per cent. Humidity between 40 and 50 per cent allows fires to pick up and spread rapidly; while humidity below 30 per cent tends to make even small fires spread beyond control.

The instrument most used in the forests in measuring humidity is known as a "sling psychrometer." It consists of a pair of thermometers, one of which has its bulb wrapped in muslin. Before the instrument is used, the muslin is moistened. The thermometers are then whirled rapidly in the air, and evaporation causes the thermometer with moistened bulb to read lower than the other. Both thermometers are read, and a table gives the relative humidity corresponding to the readings. This device is so valuable to the scientific fire-fighter that, as a recent writer has said, it "has taken its place as a fire tool beside the long-handled shovel and the double-bitted axe."

Another factor in the spread of fires is the amount of moisture in the "duff" or litter of the forest floor. A special form of hygrometer has been designed for measuring this, and experiments show that when the litter contains more than about 10 per cent of its dry weight in water it is no longer inflammable.

Winds play a part in the fire situa-

tion partly through their effects on humidity and partly through the actual spreading of brands and sparks. The winds may themselves be relatively moist or dry, according to the source from which they come, and the drying effect of a wind upon forest materials depends in part upon its velocity.

Lightning is not a common cause of forest fires in the eastern states, where thunderstorms are generally attended by heavy rain, but in the forests of the west they often occur with little rain, or none, and in this part of the country lightning fires are exceedingly common. A single thunderstorm has been known to start more than 300 fires, and a case was recently reported from Idaho in which more than 70 were started in 20 minutes. Such fires frequently occur in remote and unsettled districts, and thus get beyond control before the fire fighters can reach them.

The far-reaching control that weather exercises over forest fires was not realized, even by experienced foresters, when the present campaign of investigation was begun. Recently the records of certain very destructive fires of past years have been compared with the weather records and weather maps of the corresponding dates, and interesting relationships have been brought to light.

For example, the great conflagration that raged in northern Minnesota in October, 1918, in which several towns were laid in ashes and hundreds of lives were lost, began abruptly when, during a period of low humidity, a passing storm whipped together a few neglected brush fires, and it terminated almost as abruptly with a change in the general weather situation. On September 17, 1923, Berkeley, California, came near being wiped out by a fire that started in a brush field and forest at the edge of the city. After many buildings were ablaze, the atmospheric depression that had caused the sudden development of fire weather passed far enough east so that the wind reversed its direction and moisture-laden air from the ocean blew inward. The fire was then quickly brought under control. Not long ago a good-sized blaze in the Olympic National Forest was put out by a drifting fog.

According to official statistics more than 33,000 forest fires occur each year in the United States, burning over an area of 7,000,000 acres, and causing a direct property loss of \$16,000,000 besides a considerable loss of human life. In order to cope with this national scourge, the Federal and

state authorities and private interests expend millions of dollars every year in maintaining a vast system of lookout stations, patrols and fire fighting units. For some years Army aviators have been pressed into service to aid in keeping watch for fires in the national forests. A great campaign of educating the public on the subject of the danger inherent in camp fires, cigarettes and the like has already been fruitful of results. The "fire weather service" is the latest of these measures of protection.

During the present year a moderate increase in Congressional appropriations, supplemented by liberal aid from various other sources, has enabled the Weather Bureau to place the new service for the first time on a fairly efficient basis. The Bureau issues forecasts of fire weather from several central stations, derived partly from the indications of the daily weather maps and partly from the reports of numerous special stations located directly in the forests. The forecasts are distributed by telegraph, telephone and radio broadcasts, and are thus made promptly available to everybody concerned. It is now becoming a common practice for logging operators to close down their camps when warned of the approach of fire weather.

The lumbermen are required by law to burn the branches and tops of felled trees, as this material would greatly increase the danger of fire if left on the ground. The Weather Bureau forecasts serve to indicate the time when this process can be carried on most safely.

The scientific study of fire weather is still in its infancy. Both the meteorologists and the foresters are now devoting a large amount of attention to investigations in this field.

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The eyelids of frogs wink upwards.

Mahogany was once widely used as ship timber.

Practically 400 insects are injurious to oak trees.

October and January head the list of months for bad colds.

The California condor has a wing spread of from 9 to 12 feet.

The farthest known star is about 1,293,572,675 billion miles from the earth.

Resistance of sheet steel garages to fire is being tested by government experts.

Cactus Spines Trap Toad

A grim little memento of a tragedy of the desert has been brought back to the University of Pennsylvania by Prof. John W. Harshberger of the botany department, who recently returned from a trip through the West. It consists of the dried and mummified body of a horned toad, entangled among the curved spines of a small cactus. The skin of the luckless little animal was not punctured in any place, but its hind legs were fettered by the fish-hook-shaped thorns, and it had apparently died a slow death of hunger and thirst. The cactus appears to be much tougher than its animal victim, for though it had been torn from its roots for several weeks it showed no signs of distress, and Prof. Harshberger stated that such plants are able to live without a drop of water for several years, lying on a laboratory shelf.

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EDUCATION

Stammering Shows Character

Lisping and stammering are no longer thought "cute," and in this day and age they may prove to be fatal economic and social handicaps, in the opinion of Dr. Sarah M. Stinchfield, professor of psychology at Mt. Holyoke College. Prof. Stinchfield has made a four-year's study of the problem of speech defect in college students at Mt. Holyoke and finds in addition that they are symptoms of serious character defects as well.

"Girls with speech defects rarely become leaders in college activities or rise to the top in scholarship or in creative work," Prof. Stinchfield said. "While some of the girls who lisp and stutter do have superior mental endowments, most of them fall into classes whose scholarship is low. They almost never belong to honor societies in college and in the future they are apt to be seriously handicapped in the business or professional worlds."

Unsettled home conditions, domineering parents and feelings of inferiority in the home because of an older brother or sister who is more brilliant are often to blame for emotional instability, Prof. Stinchfield explained. Deep seated feelings of inferiority caused in the home or in school are at the bottom of the inability of children to express themselves easily or to talk normally in many cases, it is believed.

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X-Ray Reveals Portrait

The uncanny power of the X-ray to reveal the mysterious past careers of paintings is proving of great assistance to art critics. The most recent test in which this technique was used to solve an art puzzle was in connection with a portrait belonging to the Metropolitan Museum of Art. The X-ray diagnosis of the painting was made by Alan Burroughs, of Harvard University, who has spent some time experimenting in this field at the Fogg Art Museum of Harvard.

The portrait, which represents a young woman with dark hair, dressed high, and a stiff round lace ruff, was believed to be by Frans Pourbus, because of the treatment of the lace collar and certain other details. The face, however, was recognized as having been painted over in more recent times. Connoisseurs hesitated to recommend removal of the face, fearing lest the original features might be found too badly damaged for restoration, so an X-ray diagnosis was attempted. The result proved that the original portrait, differing considerably in features from the later face, was practically intact, and represented an authentic old painting of good workmanship.

Success of X-rays in detecting art forgeries and in revealing hidden layers of pictures is due mainly to the fact that vegetable colors used by modern painters are transparent to the rays, whereas the mineral colors of the older painters intercept them.

Mr. Burroughs, who is now in Europe making X-ray photographs of masterpieces in the Louvre and Berlin Museums, states that the X-ray shows up the technique of different painters. The clean-cut, sure strokes of the master are very different from the nervous, patchy strokes of the art forger or the mediocre copyist, he finds.

Science News-Letter, October 2, 1926

Gypsies Speak Hindu Tongue

Modern gypsies, traveling over the country in Fords, speak a tongue their ancestors brought out of India between twelve and fifteen hundred years ago.

Dr. John Sampson, an eminent British philologist, has made a 30-year study of an isolated gypsy tribe in the mountains of Wales, and has found that the tongue they speak is still a real Indian language and not a mere jargon.

The relation of Gypsy languages to each other regardless of the country in which the tribes are found and their resemblance to several of the current vernaculars of central India is well known to scholars. They are all descended from Sanskrit, the oldest of Aryan tongues, but many Gypsy dialects on account of peculiar circumstances are apparently nearer in some respects to the mother tongue than the languages spoken in the region where it had its origin.

Ancestors of the present-day Gypsies wandered away from their home in central India at some time about the beginning of the Christian era into the mountains of Hindu Kush. Several centuries later they were driven out by the advance of the Huns and this invasion evidently started them on their world wide travels.

Authorities have suggested that in the course of their nomadic and rather anti-social life it was to their great advantage to have a language which was not intelligible to their enemies and that this doubtless was a powerful factor in preserving the ancient tongue.

Science News-Letter, October 2, 1926

Pictures were the first form of writing used by primitive man.

Seven new species of birds have recently been found in Yucatan.

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Anniversaries of Science, p. 15. Articles marked with * in classifications below.

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CHEMISTRY

Ice Cream from Crude Oil,* p. 1. Synthetic Rival to Quinine, p. 3. Burning Atomic Hydrogen, p. 11. Light Railway Cars, p. 11.

PHYSICS

He Knows the Sun,* p. 1. Smaller than Electron, p. 3. X-Ray Reveals Portrait,* p. 7. Mars Closest to Earth, p. 9. Burning Atomic Hydrogen, p. 11. Copernicus' Universe, p. 13.

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Dead Brought to Life,* p. 3. Heart Hormone Discovered, p. 3. Synthetic Rival to Quinine, p. 3. Stammering Shows Character, p. 7.

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Mars, Ruddy Planet, Closest to Earth This Month

By JAMES STOKLEY

Since last spring Mars has been approaching the earth, but so far has only been visible as a morning star, in the eastern sky before sunrise. This month, and better still in the coming months, it will be conspicuous in the eastern evening sky as a brilliant red object.

To those who watched Mars in the summer of 1924, it now comes as an old friend returning after many wanderings. On the 27th, when it will be closest, it will have more than completed an entire circuit of its orbit, traveling more than a billion miles, since the night of August 22, 1924. In the same time, the earth will have traveled more than a billion and a quarter miles in its orbit.

Last September, when Mars was on the side of the sun directly opposite the earth, the two planets were farthest apart, over 230,000,000 miles separating us from each other. But on the 27th of October, it will be but 42,624,200 miles from us, farther than in 1924, but better for astronomical observation, despite the additional distance because earth's atmosphere absorbs light.

Stars, and planets likewise, appear fainter and more unsteady when they are near the horizon. This autumn Mars will be considerably higher in the sky for observers in northern countries than it was in 1924; and as most of the world's observatories are located north of the equator, the planet will be better situated for observation, though its distance is about 25 per cent greater than in 1924.

Of most popular interest when we speak of Mars are the so-called "canals." Discovered in 1877 by the Italian astronomer Schiaparelli, they have since been a bone of contention among astronomers. But in 1924, at the great Lick Observatory of the University of California, situated on Mt. Hamilton, near San Jose, California, Dr. R. J. Trumpler watched the planet with the thirty-six inch telescope and was well rewarded for his pains. He made many drawings of the canals and what he saw was verified by Prof. W. H. Pickering, at the branch station of the Harvard College Observatory at Mandeville, Jamaica.

A photograph is often accepted in a court of law as the best possible evidence, and when one sees a photograph of the "canals," it would seem that there is no further question of

their existence. But the best photograph of Mars that has ever been made shows but a small fraction of the detail that can be perceived by a trained observer, when looking through a powerful telescope.

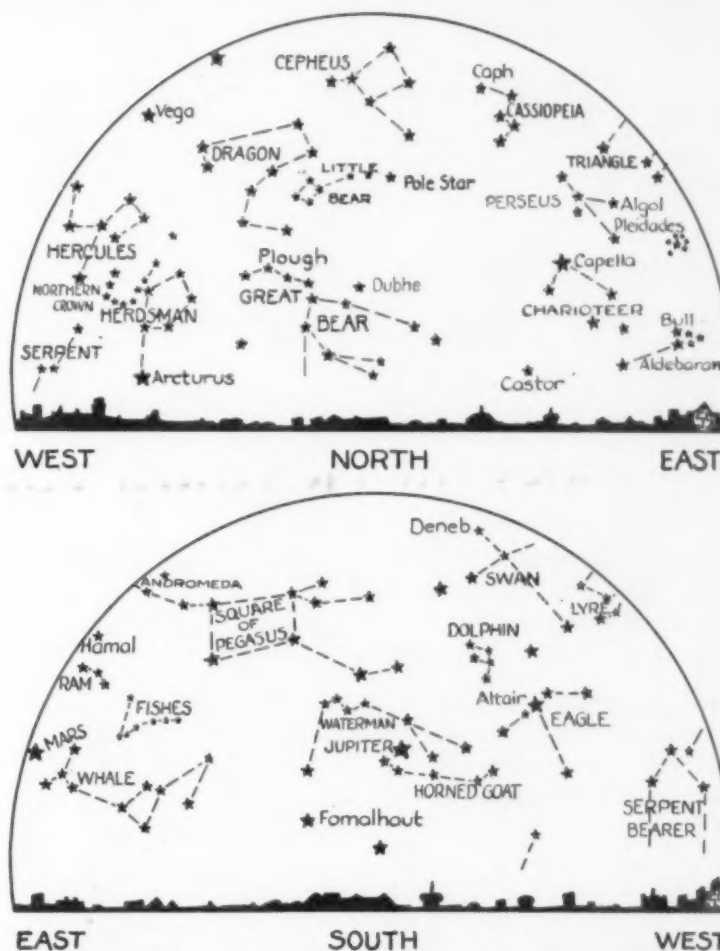
One reason for this is the red color of the planet. When a photograph is made of Mars, the exposure must be very much longer than if the planet were blue, a color which has a greater effect on the photographic plate. While the exposure is being made the planet moves slightly, but this does not produce as serious an effect as the atmosphere of the earth. Continually in motion, the layers of different temperature in the air bend the rays of light from the planet first one way, then another, so that sometimes the edge of the object is sharp and distinct, and the next moment it seems to "boil."

When an experienced observer looks at such an object, the occasional glimpses that he gets when the "seeing" is good, suffice to give him an

accurate idea of the general appearance. The plate, however, can not select the most favorable moments, but must take the combined appearance over a period of at least several seconds.

Despite these difficulties, E. C. Slipher, at the Lowell Observatory at Flagstaff, Arizona, has succeeded in recording them on the photographic plate, and Dr. Trumpler, at the Lick Observatory has also made pictures which reveal them. This does not necessarily prove them to be artificial, and the general idea is that they are due to some unknown, but natural cause.

As for the other planets, Jupiter is the most conspicuous in the evening sky, for it is still the brightest object, next to the moon. Saturn has descended so low in the east that it is barely visible just after sunset, and soon it will vanish from our sight until next year. Venus is visible as a morning star.



These two maps show the principal constellations that are visible in October. Face north or south, and hold the map in front of you, and it will show the stars as they appear in the sky.

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Deliberate killing of wild animals is proceeding at such a swift pace that one scientist fears that man will eventually be the only mammal left on earth.

Julius Caesar is said to have made secret memoranda by moving each letter of the alphabet forward four places, using d for a, e for b, etc.

Government tests of 10 brands of hotel chinaware showed that the most durable china was 50 per cent harder than the softest ware.

It is probable that plants bend toward the sun because the tension of their protoplasm is greatest on the side exposed to light.

Young chickens, as well as old, may be infected with tuberculosis and spread it to hogs, according to recent tests.

Better not to know so much than to know so much that is not true.—
Josh Billings.

The color of apples depends upon their nitrogen content, the highest colored fruit having the least.

Fats have more than twice the fuel value of sugar, starch, or protein when digested in the body.

It would take an express train 200 years at full speed without stopping to travel from the earth to the sun.

More than 2,000 years ago, historical records in China were written on bamboo tablets, strung together like a fan.

There is a large bed of pure Epsom salts near Death Valley, California.

Ordinary soft coal after drying consists of about three-fourths carbon.

The jaguar, which has the usual fondness of cats for fish, is an expert fisherman.

Salt mines in the Carpathian Mountains have been worked since the eleventh century.

Opium is gathered from the seed pod of the opium poppy when the petals first unfold.

The faintest stars that can be seen by the naked eye are classed in the sixth magnitude.

The female of one species of spider carries her young about on her back, like Indian papooses.

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Burning Atomic Hydrogen

By EDWIN E. SLOSSON

A chemical combination that produces greater heat than any hitherto known has been discovered by Dr. Irving Langmuir of the General Electric Company.

For over a hundred years the highest heat attainable by combustion was that produced by the burning of hydrogen in an atmosphere of oxygen. But Langmuir has found it possible to get a higher temperature by the unprecedented process of burning hydrogen in an atmosphere of hydrogen. In the oxyhydrogen blowpipe, commonly used for welding or the lime-light, two atoms of hydrogen united with one atom of oxygen to form a molecule of water. In the new Langmuir blowpipe two atoms of hydrogen simply unite with each other to form a molecule of hydrogen.

The novelty of the process consists in the possibility of producing a stream of hydrogen gas in the form of single and separate atoms instead of paired atoms, in which hydrogen has been hitherto handled. The coupled hydrogen atoms are divorced by passing a stream of the gas through an electric arc. The apparatus is simple, and looks like the ordinary blowpipe that you see used in welding or cutting steel on the street car track. It is held in the hand and the point of the flame directed on the metal while the head of the operator is enclosed in a helmet to protect the eyes and face from the intense light and heat.

A stream of hydrogen from a small copper tube is driven between the tips of the two tungsten electrodes and projects a double flame several inches long. The inner flame consists of atomized hydrogen burning in molecular hydrogen, while surrounding this is a flame of molecular hydrogen burning in air.

A tungsten wire stuck into the tip of the inner flame melts and drops off like an icicle in a gas jet. Now tungsten is a metal so refractory that it required many years of experimentation to find a way of getting it sufficiently softened so that it could be drawn into filaments for electric lamps. Its melting point is over six thousand degrees Fahrenheit, so the temperature of the flame of atomic hydrogen is doubtless more than seven thousand.

(Just turn the page)

Ice Cream From Crude Oil

(Continued from Page 1)

that objection, for he foresees the utilization of the limitless stores of energy confined within the atom, as manifest in radium.

"When I saw not long ago in the laboratory of Dr. S. C. Lind a tiny drop of a colorless oil that had been formed from methane—the chief constituent of natural gas—as a result of the action of this form of energy upon it, I felt a new era in chemistry had dawned," Dr. Norris said. "That droplet meant a supply of combustible liquid to run our automobiles when petroleum is exhausted. We can make methane from carbon and hydrogen when the supply of natural gas fails us. The sun will always be able to convert carbon dioxide into a form from which we can get back carbon."

Dr. G. J. Esselen demurs to the suggestion of synthetic ice cream and expressed a preference for the old-fashioned method of feeding the cellulose to a cow. But in his own field Dr. Esselen was quite as radical in his prophecies as Dr. Norris. He goes so far as to surmise that the synthesis of cellulose may some day be accomplished in the factory as it is now in the field from the free raw materials of air and water.

Cellulose, which is the woody stuff of trees and other plants, now requires months or years to grow, but if the chemist once learns how to make it he may turn out a purer product in a few days or hours. Already the first steps toward this achievement have been taken. It has been found possible to make glucose artificially by the action of ultraviolet rays on water and carbon dioxide, that is, on "soda-water." It is easy to convert cellulose into glucose, and if we only knew how to reverse this reaction synthetic cellulose would be possible, though whether it would be profitable or not remains to be seen.

Science News-Letter, October 2, 1926

METALLURGY

Light Railway Cars

The Germans are apparently going in for railway efficiency through saving of weights. Herr Peterson, an engineer of Frankfurt, reported that in building two new trains for a Berlin local railway, the construction was entirely of aluminum alloyed with lithium. Aluminum is the lightest of present industrial metals, and lithium, though it adds strength to the alloy, weighs only one-fifth as much per given bulk.

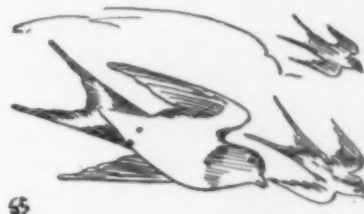
Science News-Letter, October 2, 1926

NATURE RAMBLINGS

By FRANK THONE

Migrations and Hibernations

The flowers fade, the leaves fall from the trees, and birds speed southward. The time for the Great Cold is near at hand, and those who find it hard to combat must learn to fly.



Human folk who have their favorite winter resorts in the frostless lands and their favorite lines over which they travel every autumn were long anticipated by the birds. It is a fact well known to ornithologists that birds of the same flock winter in the same general regions year after year, and that many species have lines of migration marked out as sharp and definite as railway tracks.

To a very large extent these lines are determined by the great river courses. One of the greatest channels of bird travel in the world is the flood plain of the Mississippi river, with its feeder, the Missouri. In the East, Lake Champlain and the Hudson river form links in a similar southward caravan route of the air.

Where a river occupies a deep valley between mountain systems, it is easy to understand why birds hold to it in preference to the colder and more arid heights. But there is a reason, equally good if less immediately apparent, why birds follow a great prairie stream. Such a stream bears along its banks a great belt of sheltering and food-offering timber—perhaps the only continuous line of trees to be found in the whole long flight. These are highly important to the perching birds, while the swimmers and waders naturally prefer to keep at least a thread of blue water in sight to which they may descend for feeding and sleep at night.

As autumn advances songs become rarer and rarer. The birds have departed, and insects die mutely in countless swarms or dig into the ground or seek cracks under stones or crevices in trees. The coldblooded virtuosi of our marshes and ponds, the frogs and toads, burrow into the

(Just turn the page)

Nature Ramblings This Week

(Continued from Page 11)

mud, as do their voiceless "contemporary descendants," the reptiles. Old age comes not once a lifetime but once a year to the poor beasts not blessed with warm blood.

It would be almost true even to say that death comes to them once a year. The chill which they cannot resist, the stiffening of their limbs, the dulling of such poor mental faculties as they have march closer day by day until, in anticipation of the death-like sleep of hibernation (which would be the final sleep of death if they failed to take it in time) they dig their own graves like the extravagant ascetics of old and literally bury themselves to wait until spring brings resurrection.

A hibernating frog or toad can survive cold that would certainly kill a mammal or bird. There are experimental cases on record where these animals have been frozen solidly into cakes of ice and when thawed out came to life and hopped around. True, they died afterward; but a warm-blooded creature treated that way would never have "come to" at all. So being a batrachian has at least a few compensating advantages.

Science News-Letter, October 2, 1926

Grasses that grow in the shade are less nutritive for cattle than those that grow in the sunlight.

The quality of wool is materially affected by the kinds of feed given to the sheep.

Over 11,000 foreign chestnut trees have been planted in the Meade National Forest.

Pittsburgh is drawing plans for a subway to relieve the growing traffic congestion.

A traveler in an unexplored region of Africa recently discovered two large extinct volcanoes.

Vulcanizing was first achieved when a pot of rubber upset and came into contact with sulphur.

Some 30 distinct nationalities are represented among the 300,000 people of the Territory of Hawaii.

Doves are important weed destroyers; one dove was found to eat 9,200 weed seeds at a single meal.

The Roman Emperor Nero had snow brought down from the mountains to cool his wine.

Burning Atomic Hydrogen

(Continued from Page 11)

If the blowpipe is turned upon the tip of a cone of alumina, the refractory ingredient of clay and porcelain, this melts down like a tallow candle in a Bunsen burner. If a sheet of steel or other metal is rolled into a tube the seam can be welded without solder by simply running the blowpipe along the joint. When the flame plays on a plate of chrome steel it leaves a string of puddles in its track.

The heat is higher than that of the familiar oxy-acetylene blowpipe though not so high as in the electric arc itself. Dr. Langmuir suggested that we may in time get rid of the rattle of riveting which annoys the neighborhood when a skyscraper is being constructed, and the welded joints of the steel frame would be stronger since no holes need be bored in it.

A further advantage of the new flame is that the metals heated by it are not oxidized, since they are completely enclosed in hydrogen gas. This makes it possible to weld such light metals as aluminum and magnesium, which when heated in air fall into white powder.

Science News-Letter, October 2, 1926

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Copernicus' Universe

Quotation from Copernicus (Nicolaus Koppernigk, Polish mathematician and astronomer): *DE REVOLUTIONIBUS ORBIUM CELESTIUM*. Chap. X. Exponent, rediscoverer and popularizer of the heliocentric theory of the solar system, who received the first printed copy of his book on his deathbed in 1543.

First and above all lies the sphere of the fixed stars, containing itself and all things, for that very reason immovable; in truth the frame of the universe, to which the motion and position of all other stars are referred. Though some men think it to move in some way, we assign another reason why it appears to do so in our theory of the movement of the earth. Of the moving bodies first comes Saturn, who completes his circuit in xxx years. After him, Jupiter, moving in a twelve-year revolution. Then Mars, who revolves biennially. Fourth in order an annual cycle takes place, in which we have said is contained the earth, with the lunar orbit as an epicycle. In the fifth place Venus is carried round in nine months. Then Mercury holds the sixth place, circulating in the space of eighty days. In the middle of all dwells the Sun. Who indeed in this most beautiful temple would place the torch in any other or better place than one whence it can illuminate the whole at the same time? Not ineptly, some call it the lamp of the universe, others its mind, others again its ruler—Trimegistus, the visible God, Sophocles' Electra the contemplation of all things. And thus rightly in as much as the Sun, sitting on a royal throne, governs the circumambient family of stars. We find, therefore, under this orderly arrangement, a wonderful symmetry in the universe, and a definite relation of harmony in the motion and magnitude of the orbs, of a kind it is not possible to obtain in any other way.

Science News-Letter, October 2, 1926

HEREDITY

Degenerate Sons

No race as a whole can be made up of "degenerate sons of noble sires." Where decadence exists, the noble sires have perished, either through evil influences, as in the slums of great cities, or else through the movements of history or the growth of institutions. If a nation sends forth the best it breeds to destruction, the second best will take their vacant places. The weak, the vicious, the unthrifty will propagate and in default of better will have the land to themselves.

—David Starr Jordan.

Science News-Letter, October 2, 1926

Food and Predjudice

Quotation from *CARGOES AND HARVESTS*. By Donald Culross Peattie. New York: D. Appleton and Co.

To show to what length a racial prejudice in agriculture will go, the case of a gang of engineers and laborers in Brazil may be cited. Imported from the United States for construction work in the Amazonian jungle, they were fed regularly on white bread, meat, cornstarch and other common American diets, all imported from the United States and shipped up river at enormous expense. It might have been thought that food as good as this would be satisfactory, but fresh vegetables and fruits, being perishable, had naturally been left out and as a result beriberi soon began its ravages, until the little white tombstones beyond the camp were more numerous than the tents of the survivors. Some one suggested that they should eat the fruits and nuts on which the natives and animals fed in the forest. But this idea was scornfully rejected because no white man cared to eat "monkey food." In fact, it was preferable to die. The same prejudice against substitutes was felt during the food crisis of the Great War.

Science News-Letter, October 2, 1926

CUSTOMS

Lawbreaking America

Quotation from *PSYCHOLOGIES OF 1925*. By Knight Dunlap. Worcester, Mass.: Clark University.

Americans are notoriously a law-breaking people. Among the vast mass of statutes which we legally adopt and contemptuously disregard, the Volstead act is a mere minor detail. Fish and game laws are notoriously intended for the other fellow. In some states elaborate Sunday laws exist, and are unanimously broken, even publicly broken by many of the individuals who are active in keeping the laws on the statute books. Speed laws are mere joyous scraps of paper, and automobile manufacturers do not hesitate to boost their wares by advertising them as capable of speeds much higher than any state legalizes. Some states have recently passed laws requiring all motor cars to come to a full stop at all railroad crossings; and in those states I have not yet heard of any one who stops if he does not think a constable is in view. Laws against gambling in various forms are common; and are not regarded by anyone who has no conscientious scruples against taking a chance.

Science News-Letter, October 2, 1926

First Glances at New Books

FLOWER SCENT. By F. A. Hampton. London. Dulau & Co. 4s 6d.

A compact little monograph attacking a problem made difficult by the vanishing sense of smell in man. The author undertakes a classification that will take cognizance both of the physiological perception and of the chemical arrangements that stimulate it. A useful book of reference for biological, psychological and organic chemical laboratories.

OSTRICH EGGSHELL CUPS OF MESOPOTAMIA AND THE OSTRICH IN ANCIENT AND MODERN TIMES. By Berthold Laufer. Chicago. Field Museum of Natural History.

Includes, besides full information on eggshell cups, a summary of the appearance of ostriches in the literature and on the monuments of all nations of antiquity.

THE GIST OF EVOLUTION. By Horatio Hackett Newman. New York. The Macmillan Co. \$1.50.

A compact statement of the principal facts and arguments supporting evolution, with refutations of the most frequent anti-evolutionary arguments. Suitable for the intelligent non-scientific reader, and for class use in elementary courses.

THE RELATION OF NATURE TO MAN IN ABORIGINAL AMERICA. By Clark Wissler. New York. Oxford University Press. \$3.50.

A comprehensive survey of traits and types of culture among the Indians, showing how geography shaped and limited these primitive tribes.

PAPERS FROM THE DEPARTMENT OF MARINE BIOLOGY OF THE CARNEGIE INSTITUTION OF WASHINGTON, VOL. XXIII. Washington.

Six technical papers on various aspects of the marine biology and geology in various islands of the Antilles and the South Pacific.

CARGOES AND HARVESTS. By Donald Culross Peattie. New York. D. Appleton & Co. \$2.50

Chapters from the history and romance of international agriculture; rubber, tea, camphor, potato, cotton, tobacco, etc.

THE TIDE. By H. A. Marmer. New York. D. Appleton & Co. \$2.50.

The first book that adequately, both technically and popularly, tells how the moon affects the waters of the earth.

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ANNIVERSARIES OF SCIENCE

The path of progress to the present estate of science is marked by dates, which though often lacking notice at the time, were in many cases turning points of civilization's history.

Each week there will appear in this space a brief calendar of scientific anniversaries. Perhaps this will help carry out an idea that Professor Michael Pupin thus expresses in his autobiography, "From Immigrant to Inventor."

"I often think of an old idea which I first conceived while a student at Cambridge. It is this: Our American colleges and universities should have days consecrated to the memories of what Maxwell called the fathers of the sciences, like Copernicus, Galileo, Newton, Faraday, Maxwell, Darwin, Helmholtz. I mention these names, having physical sciences in mind, but similar names can be mentioned in other departments of human knowledge. Why should not science follow the beautiful example of religion, which has its saints' days? On these memorial days, say Newton's birthday, an address on Newton and his work should tell the young student why Newton is the father of the science of dynamics. Dynamics is not a mere collection of inexorable physical laws which to a young student often sound like dry scientific facts and mute formulae. Many textbooks, unfortunately, represent it that way. It is a record of the life-work of men who lived human lives and became what my mother called 'saints of science,' because they devoted their life-efforts to the deciphering of divine messages which, through physical phenomena, God addresses to man. The young mind should know as early as possible that dynamics had its origin in the heavens, in the motions of heavenly bodies, and that it was brought to earth by Galileo and Newton when they had deciphered the meaning of the divine message conveyed to them by these celestial motions. The Greeks of old sacrificed to their gods a hecatomb of oxen whenever one of their philosophers discovered a new theorem in geometry, and the philosopher's memory was praised forever. The modern nations should not remain indifferent to the memory of the 'saints of science,' whose discoveries have advanced so much the physical and the spiritual welfare of man."

October 2, 1836.—Charles Darwin returned from his five-year cruise as a naturalist on board H. M. S. *Beagle*. As a result of the observations made

upon this trip, Darwin decided to devote his life to zoological research.

Certainly, no fact in the long history of the world is so startling as the wide and repeated exterminations of its inhabitants. Nevertheless, if we consider the subject under another point of view, it will appear less perplexing. We do not steadily bear in mind, how profoundly ignorant we are of the conditions of existence of every animal; nor do we always remember, that some check is constantly preventing the too rapid increase of every organized being left in a state of nature.—Darwin: *Voyage of the Beagle*, Chapter VIII.

October 4, 1601.—Death of Tycho Brahe. Brahe studied the motions of the sun, moon and planets, and corrected the known value of the places of 777 fixed stars. He tried to reconcile the Ptolemaic and Copernican theories of the structure of the solar system.

"Your alchemy has turned more gold to lead Than Denmark can approve. The uses now! Show us the uses of this work of yours!" Then Tycho showed his tables of the stars, Seven hundred stars, each noted in its place With exquisite precision, the result Of watching heaven for five-and-twenty years. "And is this all?" they said.

—Alfred Noyes: *Watchers of the Sky*.

October 5, 1582.—This day began the dating by the Gregorian calendar. The Julian calendar was founded when astronomical observations could not be made with great accuracy, since the measuring instruments were very crude, and the calendar had fallen behind, due to errors in the Julian reckoning, by ten days. October 5 was therefore, by order of Pope Gregory, declared to be October 15, New Style. The Old Style calendar continued to be used by peoples subject to the Greek Church until October 13, 1923, the error by that time amounting to 13 days.

The errors were (1) that the year contains exactly $365\frac{1}{4}$ days, and (2) that 235 lunations are precisely equal to 19 solar years.

The Gregorian calendar is in error by 26 seconds in the length of the year, which will make our calendar one day ahead in 3325 A. D.

October 6, 1769.—New Zealand first explored by Captain James Cook, of the English ship *Endeavor*, while searching for a great continent supposed to exist in the south Pacific.

By making almost the whole circuit of New Zealand, he (Capt. Cook) ascertained it to be two islands, with a strength of evidence which no prejudice could gain-say or resist. He obtained likewise a full acquaintance with the inhabitants of the different parts of the country, with regard to whom it was clearly proved that they are eaters of human flesh.

—Kippis: *Captain Cook's Voyages*.

Science News-Letter, October 2, 1926

ASTRONOMY

Jupiter's Moons Face Planet

At least three of the moons of Jupiter, like the moon of the earth, rotate once on their axis in the same time that it takes them to make one revolution around their parent planet, is the statement of Dr. Joel Stebbins, professor of astronomy of the University of Wisconsin, working at the Lick Observatory, Mt. Hamilton, California.

Dr. Stebbins is making use of the 12-inch refracting telescope of the observatory, and a photoelectric photometer, by means of which the light from a star, planet or moon is focussed on a film of metallic potassium. This results in a minute electric current which can be measured with a delicate galvanometer, and so the brightness of the object can be accurately determined.

The chief difficulty is in keeping the brilliant light from Jupiter itself off the cell, but Dr. Stebbins has overcome this by the use of a small diaphragm with a hole through which the light from the satellite can shine, but not the planet. However, satellite I, the nearest to Jupiter, is too close to be measured even with this method.

Measurements have been made of II, III and IV. All of these satellites were discovered by Galileo in 1610, and can be seen with a small telescope. In addition there are five others, but these require a large instrument to make them visible.

Moons II, III and IV take 3 days, 13 hours; 7 days, 4 hours and 16 days, 18 hours respectively, to revolve around Jupiter and Dr. Stebbins finds that the variation of the light of the first two at least also follows these periods. This, he explains, is probably due to their being bodies like our moon, and unequally bright over their surface, so that as a greater or less area of the bright surface is exposed to the earth their light is greater or less, because this is largely reflected sunlight.

In order to check the photoelectric cell, Dr. Stebbins compares the light of the satellites with nearby stars, whose light is constant, and he suggests that this may be used as a possible check on the variation of sunlight. Direct measurements of sunlight vary greatly because of variations in atmospheric conditions, but since these would affect alike the brilliancy of the satellites and of the comparison stars, a variation in the difference between satellites and stars would indicate an actual variation of sunlight.

Science News-Letter, October 2, 1926

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